

A Guide to the Diagnosis and Management of 17 CDC Category B Bioterrorism Agents (“BEWARE OF GERMS”)

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This poster is for strictly educational purposes and should not be used to select specific diagnostic or therapeutic choices. Contact your local Department of Health if any of these diseases are even suspected and ask for guidance on specific tests and therapies. Some antibiotics are not FDA-approved for the indications listed.

	Brucella	Epsilon–Toxin	Water		Alphaviruses		Ricin–Toxin	Encephalitis (see Alphaviruses)
Microbiology	4 human pathogens: <i>Brucella</i> (<i>B. melitensis</i> , <i>B. suis</i> , <i>B. abortus</i> , <i>B. canis</i> . A Gram-negative coccobacillus bacteria. Animal or food-borne (e.g., milk or cheese) or aerosolized as a Bioterrorism (BT) agent.	<i>Clostridium perfringens</i> (Epsilon is 1 of 12 toxins). Gram-positive anaerobic spore-forming bacteria. Epsilon toxin is a permease enzyme made by strains B and D of <i>C. Perfringens</i> . Possibly aerosolized as a BT agent.	Cholera <i>Vibrio cholerae</i> . A curved, gram-negative rod bacteria. Water or food contamination.	Cryptosporidium <i>Cryptosporidium parvum</i> . A protozoan parasite (the only one in CDC Category A, B, or C bioterrorism agents)	Venezuelan Equine Encephalitis (VEE) VEE virus complex. 8 mosquito-borne RNA alphaviruses. Aerosolized as BT agent.	Western Equine Encephalitis (WEE) WEE virus. Closely related to VEE and EEE viruses. Mosquito-borne RNA virus. Aerosolized as a BT agent.	A TOXIN made from the waste of processing castor beans into castor oil. Acts on the 60s ribosomal subunit and blocks binding of elongation factor 2. Can exist as powder, aerosol, pellet, or dissolved in water or acid. www.bt.cdc.gov/agent/ricin/faq/index.asp http://emedicine.com/emerg/topic889.htm	Eastern Equine Encephalitis (EEE) EEE virus. Closely related to VEE and WEE alphaviruses. Mosquito-borne RNA virus. Aerosolized as a BT agent.
Precautions	Standard. No person-to-person spread by air. But highly infectious as primary aerosol: only 10-100 inhaled organisms cause disease in humans. US Army Medical Research Institute of Infectious Diseases (USAMRIID) Med Management Bio Casualties Handbook. 4th edition (2001). p. 27.	Standard. No known person-to-person spread by air.	Contact. No person-to-person spread by air.	Contact. No person-to-person spread by air. Spread is fecal-oral via water, food, soil, infected objects.	Standard. No person-to-person spread by air. Also infects horses ("Equine" e.g., 10,000 horses in Texas in 1971).	Standard. No person-to-person spread by air.	Standard: for health care workers. USAMRIID handbook 4th Ed. (2001). P. 76 (under review by DC DOH and CDC as of April 10, 2003) No person-to-person spread by air or casual contact. CDC/NIOSH Information for First Responders: "AVOID ALL CONTACT. Ricin may adhere to skin or clothing". Use goggles, Self-Contained Breathing Apparatus, HEPA PAPR, protective clothing. 3/24/03 www.bt.cdc.gov/agent/ricin/erc9009-86-3.asp	Standard. No person-to-person spread by air.
Clinical Features	Incubation period: 5-60 days. Fever and "flu-like" presentation. Headache, myalgias, back pain, arthralgia, nausea, vomiting diarrhea, cough, pleuritic chest pain, pneumonia, and hilar adenopathy can occur, hepatitis, rarely meningitis/encephalitis, or endocarditis.	No human data for disease due to pure Epsilon-toxin. If aerosolized epsilon toxin occurs, then pulmonary edema, kidney failure, shock, and multiorgan failure may follow, based on animal studies in sheep, goats, and mice. Am J Med Sci 2002; 323:326-340 (In contrast, "gas gangrene" usually is due to <i>C. Perfringens</i> strains A-E alpha toxin, rather than epsilon toxin).	Abrupt onset of watery ("rice water") diarrhea that can exceed 1 liter/hour. Fever is rare (< 5%). Vomiting can occur. Uniquely, can cause severe dehydration in a few hours, with hypotension, very weak pulse, oliguria/Acute kidney failure.	Incubation period: 2-10 days. Watery, non-bloody diarrhea and cramps. 400,000 persons infected via water in Milwaukee (1993). Diarrhea may be cyclic over days, but resolves within 2 weeks if normal immune system. Lasts longer and more severe if immunocompromised.	Incubation period: 1-6 days. Then, a sudden febrile, incapacitating illness with headache, photophobia, myalgias, nausea-vomiting, conjunctival injection, seizures, confusion. Encephalitis and death due to aerosolized BT attack expected to be much higher due to direct infection of brain from olfactory nerve than due to usual mosquito bite. USAMRIID's Med Management Bio Casualties Handbook.4th edition (2001) p. 56-60	See Venezuelan Equine Encephalitis (VEE). Can present as a flu-like illness and progress to seizures, coma, and death. Endemic summertime disease in horses and humans now in western USA/Canada. Like VEE, low case fatality rate normally, but expected to be much higher if used as an aerosol BT agent.	Depends on whether inhaled, ingested, or injected. <u>Inhaled</u> : Within a few hours cough, chest tightness, dyspnea, nausea, then pulmonary edema, hypoxia. <u>Ingestion</u> : GI bleeding, bloody diarrhea. Liver and kidney failure. <u>Injection</u> : Muscle and lymph node necrosis at site of injection then liver and kidney failure, GI bleeding, and multiorgan failure. www.bt.cdc.gov/agent/ricin/faq/index.asp	See Western and Venezuelan Equine Encephalitis. Can present as a flu-like illness and progress to seizures, coma, and death. Endemic summertime disease in horses and humans now in easternUSA/ Canada and Gulf Coast. Higher case fatality rate (50-70%) than WEE or VEE, and expected to be even higher if used as an aerosol BT agent. Markoff. Principles & Practice ID textbook. 5 th Ed. 2000.p. 1704
Diagnosis	Clinical plus Lab: Blood or bone marrow culture growth (alert lab first as biohazard BSL-3); Immunofluorescence staining, Antibody titer rise weeks later. CXR may be normal or show infiltrate and/or hilar adenopathy. www.bt.cdc.gov Category B agents: Brucella	Clinical and epidemiologic plus: Growth of <i>C. Perfringens</i> in culture and detection of toxin in research lab assay(s).	Clinical plus Lab. <i>Vibrio cholerae</i> can be grown in culture from stool using special media.	Notify lab to look for parasite in stool samples with special stain (e.g., modified acid-fast stain).	Clinical and epidemiologic, then lab: Culture (BSL-3), IgM Ab, PCR.	Clinical and epidemiologic. Lab: Like VEE except that viremia usually not detectable for WEE. Markoff. Principles & Practice ID textbook. 5 th Ed. 2000.p. 1707	Clinical suspicion and (cluster) epidemiology (traces found in London in Jan 2003 and in Paris in Mar 2003). http://news.bbc.co.uk/1/hi/health/2636105.htm Research labs: ELISA testing for toxin in lung fluids or serum, and tissue immunohistochemical staining. Antibody rises in survivors.	Clinical and epidemiologic. Lab: Culture and Antibody tests. Virus found in serum in prodrome stage. MRI imaging shows focal lesions in thalamus and basal ganglia. Markoff. Principles & Practice ID textbook. 5 th Ed. 2000.p. 1707
Prophylaxis/Vaccines	No licensed vaccine. Consider oral doxycycline 100mg BID and rifampin 600mg QDay x 3 weeks. JAMA 1997;278:399-411	No antitoxin or vaccine available.	Manufacture and sale of the only FDA-licensed vaccine discontinued. www.cdc.gov/ncidod/dtmd/diseaseinfo/cholera_g.htm (last reviewed June 20, 2001) Chemoprophylaxis not usually recommended, but could be in BT setting. If so, depending on resistance pattern, may consider doxycycline, cipro, others. Seas & Goltuzzo .Principles & Practice of ID textbook. 5 th Ed 2000. p. 2270.	None. Hand-washing prevents transmission.	No antiviral drugs proven effective. No FDA-licensed vaccine. Unlicensed IND vaccine(s) have been tested.	No FDA-licensed drug or vaccine.	No antitoxin or FDA-licensed vaccine. Animal model vaccines only.	No FDA-licensed drug or vaccine.
Therapy	Depends on resistance pattern. Consider doxycycline 100 mg BID and rifampin 600-900mg QDay x 6 weeks. JAMA 1997; 278: 399-411 May need ICU and respiratory support.	No antitoxin. No primary role for antibiotics established, although high dose PCN and/ or clindamycin could be tried to treat the <i>C. Perfringens</i> source of toxin. ICU and ventilatory support if aerosolized epsilon toxin with multiorgan failure and shock.	Key is immediate rehydration, oral rehydration solution (ORS), or IV. "Antibiotics shorten the course and diminish the severity of the illness, but they are not as important as rehydration" www.bt.cdc.gov Category B agents: Vibrio cholerae Depending on resistance pattern, may consider doxycycline, cipro, cotrimoxazole, others Seas & Goltuzzo .Principles & Practice of ID textbook. 5 th Ed 2000. p. 2270.	None proven effective. Many tried. Rehydration. Self-limited if immunocompetent.	Supportive only. No effective antivirals. May need anti-seizure drugs and ICU care. Humans infectious for mosquitoes while acutely ill (72 hours).	Supportive. No licensed therapeutic drug.	Supportive only. No antitoxin. ICU and ventilatory support. Gastric lavage and cathartics for ingestion, but charcoal not effective. USAMRIID Med Management Bio Casualties Handbook. 4th Ed (2001).p.76	No FDA-licensed drug or vaccine.